

Appl. No. 09/901433  
Amdt. dated Feb. 24, 2004  
Reply to Office action of Nov. 19, 2003

REMARKS

The Abstract of the disclosure is amended in reply to Examiner's objection to correct typographical errors. No new matter is added by the corrections.

Claims 1-2 are rejected under 35 U.S.C. §102(b) as being anticipated by Ohmi et al. WO99/30809 (US 6,375,911 used as translation). Applicants traverse the rejection to the extent that it can be maintained.

The present invention treats exhaust gas from a CVD system by subjecting the gas to partial or full decomposition by bringing the exhaust gas into contact with a transition metal, such as iron, in a thermal swing between room temperature and 500 °C. The treated stream of gas is separated and halogenosilane and hydrogen chloride recovered. The recovered halogenosilane gas can be recycled to the CVD system. The thermal swing feature of the claimed process is critical in that it extends the useful life of the transition metal reacting agent. Carrying out the treatment of CVD exhaust gas according to Applicants' invention, adsorption of deposits on the inner wall surface of the exhaust piping can be prevented and periodic removal of deposits avoided.

The '911 patent disclose a process to treat exhaust gas from a CVD apparatus by treatment of the unreacted TCS and DCS gas with a transition metal to form hydrogen chloride and volatile silicon compounds such as silicon tetrachloride. The hydrogen chloride and volatile silicon compounds are removed by absorption in water in a detoxicating unit. No halogenosilane gas is recovered that is or can be recycled. Also, as pointed out in '911 at column 5 lines 52-53, silicon from decomposed unreacted TCS and DCS gas bonds to the transition metal catalyst. Applicants submit that the silicide formed on the transition metal catalyst shortens the useful life of the catalyst and increases the frequency necessary for regenerating the catalyst. The thermal swing process of Applicants' process provides a means to renew the catalytic surface thereby extending the useful of the catalyst. Specifically, the coefficient of linear thermal expansion of the transition metal is greater than that of the transition metal silicide. As a result, temperature rise causes the metal to expand faster than the silicide causing cracks in the outer silicide layer exposing fresh catalyst surface. The '911 patent does not disclose the thermal swing aspect of Applicants' claimed process. Since '911 does not disclose recovering the halogenosilane gas and

Appl. No. 09/901433  
Amtd. dated Feb. 24, 2004  
Reply to Office action of Nov. 19, 2003

does not disclose thermal swing as an element of the process, '911 does not anticipate claims 1 and 2. Examiner is respectfully requested to withdraw the rejection on this ground.

Claims 1-2 are rejected under 35 U.S.C. §102(b) as being anticipated by Burgie et al. (US 5,401,872). Applicants traverse the rejection to the extent that it can be maintained.

Burgie et al. ('872) discloses a process for recovering hydrogen chloride and silanes by converting a silicon bonded hydrogen with chlorine to form a more highly chlorinated silane, primarily tetrachlorosilane (Table 1). The object of '872 is to convert hydrosilanes into higher boiling chlorosilane species thereby increasing their ease of handling and recovery (column 1 lines 54-57). Burgie et al. do not disclose recovering halogenosilane gas usable in the CVD process (see description at page 9 lines 12-23). The Burgie et al. process facilitates recovery of low boiling silanes, and provides a more chlorinated silane that is not suitable for a CVD process. Burgie et al. also do not disclose a process for full decomposition of exhaust gas. In sharp contrast, as explained at page 14 lines 15-25 of the application, silicon is bonded to the transition metal reacting agent while the greatest part of chlorine is converted to hydrogen chloride. Hydrogen chloride (aq.) with a 35 wt.% concentration and less than 2 ppm silicon is obtained (page 17 lines 19-23 and figure 7). Further, Burgie et al. do not disclose thermal swing. As explained with respect to '911, thermal swing is an important feature of the invention to prolong catalyst life. Since '872 does not disclose recovering the halogenosilane gas for reuse and does not disclose thermal swing as an element of the process, '872 does not anticipate claims 1 and 2. Examiner is respectfully requested to withdraw the rejection on this ground.

Feb 24 04 03:09p

Merchant & Gould

612 332 9081

p.8

Appl. No. 09/901433  
Amdt. dated Feb. 24, 2004  
Reply to Office action of Nov. 19, 2003

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

MERCHANT & GOULD P.C.  
P.O. Box 2903  
Minneapolis, MN 55402-0903  
(612) 332-5300

Dated: 2 - 24 - 04

By Curtis B. Hamre  
Curtis B. Hamre  
Reg. No. 29,165

23552  
PATENT TRADEMARK OFFICE

K:\CLIENTS\12\12109\0045US01\P-Amendment.doc